

## CLAIMS

What is claimed is:

1. A carbon-carbon composite foam, comprising:
  - a) an open lattice of carbon ligaments forming a network of three-dimensionally interconnected cells; and
  - b) a pyrolytic carbon coating on the open lattice of carbon ligaments, wherein the carbon-carbon composite foam has a solid density of greater than 30%.
2. The carbon-carbon composite foam of Claim 1, wherein the carbon-carbon composite foam defines a structure of interconnecting pores that allow hydraulic fluid to flow through the carbon-carbon composite foam.
3. The carbon-carbon composite foam of Claim 2, wherein the carbon-carbon composite foam has an essentially-isotropic structure.
4. The carbon-carbon composite foam of Claim 1, wherein the open lattice of carbon ligaments consists essentially of amorphous carbon.
5. The carbon-carbon composite foam of Claim 1, wherein the carbon-carbon composite foam has a solid density of at least about 40%.
6. The carbon-carbon composite foam of Claim 1, wherein the carbon-carbon composite foam has a solid density of at least about 50%.

7. The carbon-carbon composite foam of Claim 1, wherein the foam includes a thermosetting polymer selected from the group consisting of polyurethanes, phenolics, and polyimides.
8. The carbon-carbon composite foam of Claim 1, wherein coating is included between a reticulated foam skeleton and a by-product of a liquid precursor.
9. The carbon-carbon composite foam of Claim 8, wherein the deposited coating includes carbon.
10. The carbon-carbon composite foam of Claim 1, wherein a coating is formed on a by-product of a liquid precursor.
11. The carbon-carbon composite foam of Claim 1, wherein the product of a pyrolyzed liquid precursor is any one of carbon, silicon carbide, and silicon nitride.
12. The carbon-carbon composite foam of Claim 1, wherein a liquid precursor for forming the product is a dielectric.
13. The carbon-carbon composite foam of Claim 14, wherein the dielectric constant of the liquid precursor is at least 0.5.
14. The carbon-carbon composite foam of Claim 1, wherein a liquid precursor for forming the product is selected from a group consisting of cyclohexane, n-hexane, benzene, methyltrichlorosilane, dimethyldichlorosilane, methyldichlorosilane, and tris-n-methyl amino silane.

15. The carbon-carbon composite of Claim 1, wherein a chemical vapor deposition coating is deposited on the pyrolytic carbon coating.
16. The carbon-carbon foam of Claim 1, wherein said foam includes pores being in the range of between about 500 and about 1,000 microns in diameter.
17. The carbon-carbon foam of Claim 1, wherein said foam includes micrographic porosity in the range of between about 60 and about 100 pores/inch.
18. The carbon-carbon foam of Claim 1, wherein said foam includes a bulk density of about  $0.04 \text{ g/cm}^3$ .
19. The carbon-carbon foam of Claim 1, wherein said foam includes a surface area of about  $1.6 \text{ m}^2/\text{g}$ .